PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Agenda Item 8
Agenda ID 12800

ENERGY DIVISION **RESOLUTION E-4646**
March 27, 2014

R E S O L U T I O N

Resolution E-4646. This Resolution names the winning grant recipients of the California Solar Initiative (CSI) Research, Development, Deployment and Demonstration (RD&D) Program's Solicitation #5 (Small Grant Solicitation). Pursuant to Decision (D.) 07-09-042, this Resolution requires Commission approval.

PROPOSED OUTCOME: The CSI RD&D Program Manager shall enter into grant agreements with seven selected recipients for a total of up to $669,160. These will be paid from the CSI RD&D Program Budget.

SAFETY CONSIDERATIONS: There are no adverse public safety impacts associated with this Resolution. New research approved by this Resolution may contribute positively to better knowledge of safety issues concerning the interconnection of generation and storage resources to distribution circuits.

ESTIMATED COST: No additional cost is associated with this Resolution, as funds were authorized by a previous decision.

SUMMARY

This Resolution, made pursuant to D.07-09-042, formally names the winning grant recipients of the CSI RD&D Program's Solicitation #5. Resolution E-4646 authorizes the CSI RD&D Program Manager, Itron, Inc., under contract to Pacific Gas and Electric (PG&E), to enter into grant agreements which will provide CSI RD&D grant funding to the winning recipients up to the stated award amounts, and to monitor and report on these recipients' activities pursuant to D.07-09-042.

BACKGROUND

Senate Bill (SB) 1 (Murray, 2006) authorized the Commission to allocate up to $50 million of the CSI program funds for research, development, demonstration, and deployment of solar technologies. The RD&D portion of the CSI program was adopted in September 2007 via D.07-09-042. In that decision, the Commission approved the "Adopted CSI RD&D Plan" which identifies the goals and objectives of the CSI RD&D program, sets forth allocation guidelines, and establishes criteria for solicitation, selection and funding of RD&D projects. It also establishes the guidelines for the RD&D program administration and RD&D program evaluation.

To implement the Adopted CSI RD&D Plan, the Energy Division oversaw the competitive selection of Itron, Inc. as the CSI RD&D Program Manager ("Program Manager"), approved via Resolution E-4179 in July of 2008. The CSI RD&D Program ("Program") is overseen by Energy Division staff, in accordance with D.07-09-042. Operational administration of the CSI RD&D Program is carried out by Itron, Inc. Energy Division staff is responsible for monitoring the Program Manager's expenses and assuring that they act in compliance with D.07-09-042, as well as participating as members of the Scoring and Selection Committees. The Commission authorizes funding awards via Resolution, as recommended by staff and the Program Manager. The Program Manager is responsible for maintaining program data, developing grant solicitations, evaluating grant requests, entering into grant agreements (after approval by Commission Resolution), monitoring progress on all approved projects, and reporting on approved projects. The Program Manager maintains a program Web site: www.CalSolarResearch.ca.gov, which provides details on all of the funded RD&D projects.

The Program is authorized by statute through 2016 and funded by the electric ratepayers of California's three largest investor-owned utilities, namely PG&E, Southern California Edison (SCE), and San Diego Gas & Electric (SDG&E).

The Adopted CSI RD&D Plan lays out the seven key principles of the Program. These principles include:

1. Improve the economics of solar technologies by reducing technology costs and increasing system performance;
2. Focus on issues that directly benefit California, and that may not be funded by others;

3. Fill knowledge gaps to enable successful, wide-scale deployment of solar distributed generation technologies;
4. Overcome significant barriers to technology adoption;
5. Take advantage of California's wealth of data from past, current, and future installations to fulfill the above;
6. Provide bridge funding to help promising solar technologies transition from a pre-commercial state to full commercial viability; and
7. Support efforts to address the integration of distributed solar power into the grid in order to maximize its value to California ratepayers.

The Adopted CSI RD&D Plan (D.07-09-042) establishes the recommended allocation of funding across different types of RD&D. Demonstration projects should receive the largest portion of the RD&D budget, followed by research, development and deployment. The majority of funds will also be awarded to relatively low-risk projects with project results expected within 1-3 years time. The Adopted CSI RD&D Plan also establishes guidelines for match funding. Applicants with projects close to commercialization are expected to bring a higher level of match funding.

Within the Program, grant funding is further allocated into three target areas:

- Grid integration
- Production technologies
- Business development and deployment

In March of 2010, the Commission adopted Resolution E-4317 for Solicitation #1, which awarded $9,320,472 in funding to 8 projects focused on grid integration.

In September of 2010, the Commission adopted Resolution E-4354 for Solicitation #2, which awarded $14,630,058 in funding to 9 projects focused on improved photovoltaic (PV) production technologies and innovative business practices.

In March of 2012, the Commission adopted Resolution E-4470 for Solicitation #3, which awarded $7,624,154 in funding to 7 projects focused on grid integration of solar energy with a secondary focus on improved photovoltaic (PV) production technologies and business development and deployment.

In February of 2014, the Commission adopted Resolution E-4629 for Solicitation #4, which awarded $6,020,145 in funding to 6 projects focused on grid integration.

NOTICE

This Resolution is presented on motion of the Energy Division and not in response to an Advice Letter.

PROTESTS

This Resolution is not the result of an Advice Letter; therefore there were no protests or responses.

DISCUSSION

Focus of the Fifth Grant Solicitation

The Adopted CSI RD&D Plan suggests that 50-65 percent of CSI RD&D Program funds be allocated to grid integration projects, with 10-25 percent allocated to production technologies and 10-20 percent allocated to business development and deployment projects.

CSI RD&D Funding by Focus Area, Solicitations 1-4

	Funds Granted	Funding Targets
Grid Integration	$21,542,208	$25,000,000 - $32,500,000
Production Technologies	$5,083,369	$5,000,000 - $12,500,000
Business Models	6,529,071	$5,000,000 - $10,000,000
Solar Energy Research Center	$10,000,000	NA
Total	43,154,648	$35,000,000 - $55,000,000

The fifth CSI RD&D Program solicitation was released on September 3, 2013 and was focused on funding small tasks or projects that address the following:

- Grid Integration, Storage and Metering
- Business Development and Deployment
- Energy Generation Technologies, and
- Cross-Cutting - projects that integrate energy efficiency, demand response and energy storage with PV.

The primary objectives for this solicitation include:

- Overcoming existing barriers to integrating high penetration PV into the electricity grid, and
- Accelerating the integration and interconnection of high penetration PV into the grid.

Timeline of the Grant Solicitation

The following outlines the timeline and process for the fifth grant solicitation.

- On August 15, 2013, the fifth solicitation (Small grant solicitation) and the CSI RD&D grant agreement were issued in Draft form for public comment by the Program Manager to the R.10-05-004 service list, as well as the mailing list maintained by the Program Manager.
- On August 23, 2013, comments on the fifth solicitation were received from stakeholders. Comments were considered prior to the release of the final solicitation documents.
- On September 3, 2013, the revised fifth solicitation was issued, including the grant agreement document. The solicitation was issued to the R.10-05-004 service list, as well as to a mailing list maintained by the Program Manager.
- By September 11, 2013, written questions were submitted to the Program Manager regarding the solicitation.
- On September 17, 2013, responses to submitted questions were posted on the CSI Program website by the Program Manager.
- On October 10, 2013, proposal responses were due to the Program Manager. A total of 28 proposals were received. Of these, 10 did not pass the initial screening and were eliminated. The remaining 18 proposals, which requested over $1.6 million in funds and contributed nearly $1.5 million in match funds, passed the initial screening.
- The Scoring Committee comprised of Itron personnel and a representative of the CPUC, evaluated the 18 proposals using the Proposal Evaluation criteria described in Table 1.
- In December, 2013, the Scoring Committee made recommendations to the CPUC. In February 2014, the CPUC's Energy Division made the final determination of the recommended proposals identified in Table 2 (See page 8).

Proposal Evaluation Criteria for Grant Solicitation

All 18 proposals were scored using the proposal evaluation criteria identified in Table 1. Proposals needed to obtain 75 percent (or 75 points) of the possible 100 points to be considered for funding. Of the 18 proposals that were evaluated by the Scoring Committee, seven passed the minimum 75 percent passing score and are recommended for funding.

Table 1: Proposal Evaluation and Scoring Criteria

SCORING CRITERIA	MAX. POINTS POSSIBLE
1. How well does the proposed research address the goals of the CSI RD&D Program?	20
2. Does the proposal include a compelling need for the project? Is the project follow-on research from a current or past CSI RD&D funded project?	20
3. Is the approach outlined in Section 3 appropriate and is there enough detail to understand the specifics of what work will be done?	20
4. Is the proposed team for the project highly qualified to conduct the working being proposed? Do the team members have prior experience conducting similar work? (Section 4)	20
5. Are the amounts and uses of the funding requested appropriate for the work to be performed? Is the funding request reasonable? (Section 5)	10
6. How well does the proposed project leverage funds from other entities or organizations? (Section 6)	10
Total Points Possible	**100**
Points Needed to Pass (75% of total)	**75**

Proposals Recommended for Funding from Grant Solicitation #5

The proposals recommended for funding are identified in Table 2. Each proposal recommended for funding is described in greater detail in Appendix A of this Resolution. As shown in Table 2, the proposals recommended for funding total $669,160 in grant funding with $380,277 in match funding.

Table 2: Recommended proposals and funding summary

Project ID	Project Title	Applicant	Requested Funding	Match Funding
SM09	Sustainable Energy & Economic Development Fund (SEED Fund)	Strategic Energy Innovations	$100,000	$60,000
SM15	Monitoring and Evaluation of a Zero Net Energy Retrofit Home with Energy Storage, Demand Response, and Home Energy Management Systems	BIRAenergy	$74,500	$27,400
SM20	Mitigation of Fast Solar Ramps Through Sky Imager Solar Forecasting and Energy Storage Control	U.C. San Diego	$100,000	$35,000
SM03	Supervisory Controller for PV & Storage Microgrids	Tri-Technic Inc.	$96,000	$32,300
SM14	BEopt Multifamily Modeling Capabilities for ZNE and iDSM in California	National Renewable Energy Laboratory	$99,000	$89,000
SM18	Comprehensive System Assessment of the Smart Grid-tied Energy Storage System Using Second-Life Lithium Batteries	U.C. Davis	$100,000	$36,917
SM19	Distributed Solar and Plug-In Electric Vehicles (PEV): Development and Delivery of an Interactive Software Platform that Provides Actionable Insights Regarding Solar Acquisition	Clean Power Research	$99,660	$99,660
	Total		**$669,160**	**$380,277**

Proposal Summaries for Projects Recommended for Funding

The following discussion provides a short summary of each project recommended for funding.

1. Proposal SM09: Strategic Energy Innovations

   Proposal SM09 from Strategic Energy Innovations leverages their Solicitation #3 project which demonstrated a solar procurement model in Northern California. This research project will extend the demonstration to California's Central Valley. Interest in this procurement method has been expressed by Fresno County, CSU Fresno and the San Joaquin Air District. The Sustainable Energy & Economic Development Fund (SEED Fund) projects at least 5 MW of new solar power contracts will result from this demonstration project and this second phase will show a 300% increase in cost-effectiveness over the previous procurement effort.

2. Proposal SM15: BIRAenergy

   Proposal SM15 from BIRAenergy builds on a Solicitation #2 project which included a retrofit ZNE demonstration home with energy efficiency measures, a solar PV system, demand response capable appliances, a battery storage system and a home energy management system. This demonstration home provides a unique opportunity for the BIRA team to perform extensive tests and evaluations of the interactions between the PV, battery storage and demand response systems through various operational modes and occupant controls.

3. Proposal SM20: University of California, San Diego

   Proposal SM20 from the University of California, San Diego will study how cloud forecasting and the ability to anticipate power changes can be integrated into the model that determines battery storage charge and inverter throughput where the storage mitigates fluctuations in the net load and provide grid support. The UC San Diego team will evaluate model optimizations to achieve the ramp fluctuation dampening with batteries half the size of those without forecasting and conduct a demonstration in actual conditions at the UC San Diego Solar Energy Test bed.

4. Proposal SM03: Tri-Technic

   Proposal SM03 from Tri-Technic will demonstrate the use of day-ahead optimization and real-time control for charging/discharging schedules for a 2 MW solar PV and 1 MWH energy storage system in order to capture the financial benefits of tariff and demand changes. The system will be demonstrated at Fort Hunter Liggett in Monterey County and will provide valuable information on the economic and environmental benefits of solar PV and storage to support the electricity grid.

5. Proposal SM14: National Renewable Energy Laboratory (NREL)

   Proposal SM14 from NREL leverages their Solicitation #1 project which expands their building optimization tool (BEopt) beyond the residential market to multifamily buildings, which account for one third of the new residential construction in California. The BEopt tool will optimize energy efficiency demand response, energy storage and PV for the multifamily market. Throughout the project, the team will test the software framework to ensure that the BEopt multifamily enhancements are accurate and reliable.

6. Proposal SM18: University of California, Davis (UCD)

   Proposal SM18 from UCD builds on the solar PV and thermal energy demonstrations that are a portion of the West Village research project funded under Solicitation #2. The project team will develop and demonstrate an optimal control strategy for demand response using a smart grid-tied energy storage system powered by PV and supported with second-life Lithium ion batteries. The UCD team will perform cost and lifetime assessments of the system to examine the feasibility of using second life batteries as grid tied energy storage. The project will examine the concepts of optimized solar energy use in a residential home, transportation and communication between vehicles and the electricity grid and second-life applications for traction batteries.

7. Proposal SM19: Clean Power Research

   Proposal SM19 from Clean Power Research will leverage their current efforts on their Solicitation #3 project and other research to develop a web based tool that consumers can use for decision-making with regard to solar PV and plug-in electric vehicles (PEV). The tool will allow consumers to visualize locally installed systems and how their economic, energy and environmental savings compare to that of their neighbors. An intuitive user interface will allow consumers to quickly obtain results with minimum input while also providing more in-depth analysis for those that are interested.

CSI RD&D Program Manager Responsibilities

The Program Manager shall finalize Grant Agreements with each of the recommended proposers, based upon the submitted scope of work. Awards from this grant solicitation shall be contingent on the grantees finalizing this Grant Agreement and entering into a contract with the Program Manager within 120 days of the Commission decision.

The Program Manager shall review the budgets of each proposal prior to finalizing a Grant Agreement with each recipient. During the months since the proposals were submitted, the funding levels may have shifted if, for example, a proposer has since received funding from another source for the same work. Therefore, the Program Manager will ensure that the funding levels are still accurate in light of any potential changes to project partners, project scope, or matching funds. If projects have received funding from another source (or lost matching funds) since the submittal of the proposal, the budget shall be modified

to reflect this new information, while remaining within the boundaries of matching fund requirements.

Finally, nearly all of the RD&D projects funded by the Program in the fifth solicitation will benefit from collaboration among award recipients, as well as collaboration with all of the investor owned utilities. Additionally, California utility representatives and industry stakeholders have offered to participate in informal collaboration committees to aid the award recipients in the success of the RD&D projects selected under this solicitation. The Program Manager will work to create a collaboration committee process to aid in the success of the CSI RD&D Program grant recipients. This process will ensure that input is provided to the grant recipients early in their projects, as the projects progress, and through a forum to share results and products when the project is complete. The Program Manager shall ensure this activity is included in all grant agreements via the scope of work.

The Program Manager shall reach a final grant agreement with each of the award recipients approved for funding within 120 days of the effective date of this Resolution. The Commission's Energy Division may extend this deadline or cancel an award if an agreement is not signed within 120 days of the Commission decision. The grant agreement will codify the scope identified in the proposal, enhanced or modified by the Scoring Committee and the Program Manager under the oversight of the Commission's Energy Division. The grant agreement will specify a CSI RD&D Program funding amount that is consistent with this Resolution and modified in a mutually agreeable manner as specified above and in the best judgment of the Program Manager under the oversight of the Commission's Energy Division.

COMMENTS

Public Utilities Code section 311(g)(1) provides that this Resolution must be served on all parties and subject to at least 30 days public review and comment prior to a vote of the Commission. Section 311(g)(2) provides that this 30-day period may be reduced or waived upon the stipulation of all parties in the proceeding.

Accordingly, this draft resolution was emailed to parties for comments.

No comments were received.

FINDINGS

1. The CSI RD&D fifth grant solicitation was carried out in accordance with the Commission direction establish in D.07-09-042.
2. The CSI RD&D Program Manager, Itron, Inc., under Energy Division oversight, reviewed the grant proposals in a manner consistent with the plan set forth in D.07-09-042.
3. The CSI RD&D Program Manger undertook a Scoring Process consistent with the direction set forth in D.07-09-042.
4. The scoring process resulted in seven proposals that meet the 75 percent scoring threshold and are recommended for funding. These seven grant recipients described in detail in Appendix A to this Resolution and specified as follows, have submitted proposals which meet the goals of the RD&D Program as described in D. 07-09-042.
    a. Proposal SM09 – Strategic Energy Innovations – up to $100,000
    b. Proposal SM15 – BIRAenergy – up to $74,500
    c. Proposal SM20 – University of California, San Diego – up to $100,000
    d. Proposal SM03 – Tri-Technic Inc. – up to $96,000
    e. Proposal SM14 – National Renewable Energy Laboratory – up to $99,000
    f. Proposal SM18 – University of California, Davis – up to $100,000
    g. Proposal SM19 – Clean Power Research – up to $99,660

THEREFORE IT IS ORDERED THAT:

1. The CSI RD&D Program Manager shall execute Grant Agreements with the following recommended 7 proposers, contingent upon their meeting all requirements detailed in the ordering paragraphs below:
    a. Proposal SM09 – Strategic Energy Innovations – up to $100,000
    b. Proposal SM15 – BIRAenergy – up to $74,500
    c. Proposal SM20 – University of California, San Diego – up to $100,000
    d. Proposal SM03 – Tri-Technic Inc. – up to $96,000
    e. Proposal SM14 – National Renewable Energy Laboratory – up to $99,000
    f. Proposal SM18 – University of California, Davis – up to $100,000
    g. Proposal SM19 – Clean Power Research – up to $99,660

2. The CSI RD&D Program Manager shall monitor and report on the progress of grant awards to the Commission pursuant to D.07-09-042.
3. The Energy Division shall review all Grant Agreements prior to their execution.
4. The Grant Agreements will not be subject to negotiation.
5. Awards from the CSI RD&D fifth grant solicitation shall be contingent on the grantees entering into an agreement with the CSI RD&D Program Manager within 120 days of the effective date of this Resolution. The Commission's Energy Division may extend this deadline or cancel an award if an agreement is not signed within 120 days of the Commission decision.
6. The CSI RD&D Program Manager shall finalize Grant Agreements with each proposal's Principal Investigator based upon the submitted scope of work and budget. The Grant Agreement will be for the scope identified in the proposal, enhanced or modified by the Scoring Committee and the CSI RD&D Program Manager under the oversight of the Commission's Energy Division.
7. The CSI RD&D Program Manager must ensure that the funding level for each project is accurate, and determine whether revisions are needed due to potential changes to project partners, project scope, or matching funds.
8. The CSI RD&D Program Manager shall work to create a collaboration committee process to aid in the success of the CSI RD&D grant projects. This process will ensure that the grant projects are coordinated with the relevant CPUC staff, provide input to the grant recipients early in their projects, provide an opportunity for peer review of projects while in process, and create a forum to share results towards the end of projects when results have been achieved.
9. This Resolution is effective today.

I certify that the foregoing Resolution was duly introduced, passed and adopted at a conference of the Public Utilities Commission of the State of California held on March 27, 2014; the following Commissioners voting favorably thereon:

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PAUL CLANON
Executive Director

Appendix A

Project Title: Sustainable Energy & Economic Development Fund (SEED Fund)

Applicant: Strategic Energy Innovations

Principal Investigator: Kif Scheuer

Partners: Optony Inc., Fresno State Community and Economic Development

Requested Funding: $100,000

Match Funding: $60,000

Target Area: Business Development / Deployment

Project Summary: The SEED team will leverage and extend their Solicitation #3 project which is demonstrating a collaborative solar procurement process for Northern California to other parts of the state, including the Central Valley and the Los Angeles and San Diego areas. For their Solicitation #3 project, the SEED team built and deployed a revolving fund model for public agencies to procure solar energy in Marin, Sonoma and Napa Counties. As part of the project, 13 public agencies released a joint RFP for 6.6 MW of solar PV and in the coming weeks will award a contract to the selected vendor.

For this project, the SEED team will demonstrate this solar procurement model in the Center Valley of California. Fresno County, CSU Fresno and the San Joaquin Air District have already expressed interest in demonstrating this procurement process. The SEED team projects that at least 5 MW of new solar contracts will result from this demonstration project and this second phase will show a 300% increase in cost-effectiveness over the prior CSI RD&D investment based on both momentum and lessons learned from the first collaborative procurement.

Scoring Committee Recommendation: Recommend for funding up to $100,000. This project is recommended as it directly addresses the CSI goal of increasing solar deployment and reducing solar costs.

Project Title: Monitoring and Evaluation of a Zero Net Energy Retrofit Home with Energy Storage, Demand Response and Home Energy Management Systems

Applicant: BIRAenergy

Principal Investigator: Rob Hammon

Partners: Woodbridge Research Associates, Climate Action Center, Sunverge

Requested Funding: $74,500

Match Funding: $27,400

Target Area: Integration of Energy Efficiency, Demand Response, Storage and Solar

Project Summary: This project builds on BIRAenergy's Solicitation #2 project titled "Low-Cost, Smart-Grid Ready Solar Re-Roof Product Enables Residential Solar and Energy Efficient Retrofits." One of the retrofit demonstration homes included energy efficiency features to reduce energy use by 30%, 5 kWAC of solar PV, demand response capable appliances, a 10.77 kWh Sunverge battery storage system and a home energy management system. The retrofit was completed and fully functional in October 2013 allowing only about 2 months of data to be collected under the Solicitation #2 grant.

The focus of this proposed work is to perform more extensive tests and evaluations of this ZNE retrofit home. The BIRAenergy team will test the interactions between the PV, distribution and battery storage systems and demand response, through different operational modes of the home including occupant control through the home energy management system and utility operation of demand response and storage to provide load management.

Scoring Team Recommendation: Recommend for funding up to $74,500. The scoring team recognizes the unique opportunity that this ZNE retrofit home provides for more in-depth analysis and evaluation of energy efficiency, energy storage, demand response, home energy management systems and solar PV.

Project Title: Mitigation of Fast Solar Ramps through Sky Imager Solar Forecasting and Energy Storage Control

Applicant: University of California, San Diego

Principal Investigator: Jan Kleissl

Partners: San Diego Gas and Electric

Requested Funding: $100,000

Match Funding: $35,000

Target Area: Grid Integration

Project Summary: Energy storage can support the integration of solar energy into the electricity grid by mitigating the fluctuations in net load; however storage is still quite expensive. This project focuses on reducing the amount of energy storage needed per feeder by up to 50% while achieving the same ramp mitigation benefits. The UC San Diego team will integrate an inexpensive cloud speed sensor developed at UC San Diego, into the sky imager forecast system to scale imaging data with absolute position data resulting in the time evolution of changing cloud patterns. This cloud forecast and the ability to anticipate power changes is a key input into the model to determine battery state of charge and inverter throughput at each time step. The UC San Diego team will evaluate model optimizations to achieve the ramp fluctuation dampening with batteries half the size of those without forecasting.

The solar forecast and energy storage controller will be demonstrated in actual conditions at the UC San Diego Solar Energy Test bed. The system performance will be demonstrated during a summer and winter month.

Scoring Team Recommendation: Recommend for funding up to $100,000. This project addresses mitigation of the impacts of solar intermittency on the grid with the use of battery storage and solar forecasting.

Project Title: Supervisory Controller for PV and Storage Microgrids

Applicant: Tri-Technic

Principal Investigator: Narayanan Sankar

Partners: Lawrence Berkeley National Laboratory

Requested Funding: $96,000

Match Funding: $32,300

Target Area: Integration of Energy Efficiency, Demand Response, Storage and Solar

Project Summary: This project will demonstrate the use of day-ahead optimization and real-time control to plan and implement charging/discharging schedules for a 2 MW PV and 1 MWh energy storage system located at Fort Hunter Liggett in Monterey County, CA. By pairing PV with electric storage and optimized control, the system will be able to capture financial benefits of tariff and demand charges. The Tri-Technic team will develop a software platform to optimize and control the resources, data collection and instructions to building SCADA using LBNL's DER-CAM model for day-ahead resource scheduling. The potential economic benefits of this system can help PV overcome one of the largest barriers—investment cost—while reducing the impact of wide-spread PV adoption for utilities, by creating more flexible, better integrated customer loads and generation.

Scoring Team Recommendation: Recommend for funding up to $96,000. This demonstration will provide valuable information on the economic and environmental benefits of solar PV and storage to support the electricity grid.

Project Title: BeOpt Multifamily Modeling Capabilities for Zero Net Energy (ZNE) and Integrated Demand-Side Management (iDSM) in California

Applicant: National Renewable Energy Laboratory

Principal Investigator: Craig Christensen

Partners: Davis Energy Group, Pacific Gas and Electric and the Sacramento Municipal Utility District

Requested Funding: $99,000

Match Funding: $89,000

Target Area: Integration of Energy Efficiency, Demand Response, Storage and Solar

Project Summary: This project builds on and leverages NREL's Solicitation #1 project titled "BEopt-CA (EX): A Tool for Optimal Integration of Energy Efficiency, Demand Response, Energy Storage and PV for California Homes". The BEopt software tool finds the least cost combination of energy efficiency and solar PV, providing support to integrated demand side management (iDSM) and Zero Net Energy (ZNE) for residential buildings in California. For this project, the NREL team will extend the tool and develop multifamily (including duplexes, triplexes, townhouses, flats and low-ride apartment buildings) residential modeling capabilities in BEopt for use in California. Specific multifamily modeling additions include developing multifamily-specific operating conditions, adiabatic surfaces, enhancements to input screens (geometry, option and site screens), enhancements to output screens (aggregate results), utilize multithreading (parallel simulations and use of multiprocessors for faster simulations) and multifamily HVAC and DHW (including solar) systems. Throughout the project, team members will test the software framework to ensure that the BEopt multifamily enhancements are accurate and reliable.

Scoring Team Recommendation: Recommend for funding up to $100,000. The project addresses residential ZNE which is a near term state policy goal for 2020. This research will extend the BEopt analysis platform to include multifamily buildings, which account for one third of the new residential construction in California.

Project Title: Comprehensive System Assessment of the Smart Grid-tied Energy Storage System Using Second-Life Lithium Batteries

Applicant: University of California, Davis

Principal Investigator: Dr. Jae Wan Park

Partners: none

Requested Funding: $100,000

Match Funding: $36,917

Target Area: Integration of Energy Efficiency, Demand Response, Storage and Solar

Project Summary: This project builds upon the solar PV, PV thermal and energy storage demonstrations that are a portion of the UC Davis (UCD) research project funded under the Solicitation #2 grant. The proposed project will develop and demonstrate an optimal control strategy for demand response using a smart grid-tied energy storage system powered by PV and supported with second-life Lithium ion batteries. The UCD team will evaluate the control schemes in a residential home equipped with PV panels, smart appliances and a level 2 charging system for a plug-in hybrid electric vehicle. Three sets of management strategies (modes) will be examined to minimize peak demand as well as to lower electricity costs. The UCD team will also perform cost and lifetime assessments of the system to examine the feasibility of using second life traction batteries as grid tied energy storage. This project will examine the concepts of optimized solar energy use in a residential home, transportation and communication between vehicles and the electricity grid, and second-life applications for traction batteries.

Scoring Team Recommendation: Recommend for funding up to $100,000. This project significantly leverages the prior funded research and will provide valuable information on PV paired storage coupled with EV charging, all of significant interest to both policy makers and the research community.

Project Title: Distributed Solar and Plug-In Electric Vehicles (PEV): Development and Delivery of an Interactive Software Platform that Provides Actionable Insights Regarding Solar Acquisition

Applicant: Clean Power Research

Principal Investigator: Brian Boler

Partners: None

Requested Funding: $99,660

Match Funding: $99,660

Target Area: Business Development and Deployment

Project Summary: The Clean Power Research (CPR) team will leverage past research efforts including work under their Solicitation #3 CSI RD&D grant to develop a web based tool that consumers can use for decision making with regard to solar PV and plug-in electric vehicles (PEV). The existing NYSERDA solar vehicle calculator web service will be used as a foundation with modifications made to separate technology financing methods, integrate Green Button data and integrate driving and charging habits. PV data collected under the CPR's Solicitation #3 grant along with other sources will be imported into the platform database for display in tabular, graphical and GIS formats. These data sets will allow consumers to visualize locally installed systems and how their economic, energy and environmental savings compare to that of their neighbors. The CPR team will develop an intuitive user interface that will allow consumers to quickly obtain results with minimum input. More in-depth analysis will also be available to consumers such as what similar consumers paid/saved, how their estimate ranks with others and actionable next steps such as contact information for PV and PEV providers.

This decision-making tool will be freely available to all California rate-payers for a minimum of one year. In the longer-term, the software tool may be licensed to utilities, energy agencies, PEV and PV stakeholders and the financial community.

Scoring Team Recommendation: Recommend for funding up to $99,660. The association of EV and solar in the economic analysis and decision making is an attractive and timely area that the proposed project will address.

End of Appendix A